



## Engineers and Capitalism in Brazil

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### ► To cite this version:

Andriei Gutierrez. Engineers and Capitalism in Brazil. Engineers and Capitalism in Brazil, Sep 2009, Warwick, United Kingdom. halshs-00411787

**HAL Id: halshs-00411787**

**<https://shs.hal.science/halshs-00411787>**

Submitted on 28 Aug 2009

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Paper:  
*Engineers and Capitalism in Brazil*<sup>1</sup>

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ABSTRACT:

*Based on a partial analysis of an ongoing survey, we have managed to observe that the changes introduced into the Brazilian social and economic environment since 1990 have had a fairly strong impact on the engineers of that country. Both the transformations of the productive structure and the change in type of state intervention (tending towards neo-liberalism) have played an important role in redefining the professional group of engineers and in the formation of collective identities. This article firstly presents the way in which the literature analyses these two transformations and their effects on the reproduction of the professional group of engineers. We then present the first results of a survey carried out amongst Brazilian engineers in 2009. We show (1) the general data constituting the professional group, (2) some developing trends amongst engineers and (3) the various structural cleavages which influence the formation of engineers' opinions towards State policy.*

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<sup>1</sup> This research is directed by Paul Bouffartigue (France) and Armando Boito Jr. (Brésil). It was partly funded by the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (Capes-Brazil).

## 1. INTRODUCTION

Brazilian capitalism has undergone profound transformations since 1990. In the productive sector, new management tools and new information technologies have profoundly altered the traditional mechanisms which defined the professional situations of a great many engineers. From the macro social viewpoint, the neo-liberal break with the former type of state intervention in economic and social development has been a determining factor for the working conditions and organisation of this professional group on the employment market. This paper considers two elements as part of a more general reflexion about the relationship between the effects of these changes on the professional group and how that group reacts within such a context.

We attempt to address two areas, political science and the sociology of professional groups.<sup>2</sup> To do this the research was carried out in several stages. This first paper attempts to look at how engineers think about State policy especially with regard to industrial policy. We particularly wish to know the ways in which the professional group of engineers is homogeneous or heterogeneous regarding this subject. We are interested in trying to see whether their opinions about State policy have chain reactions on the composition, maintenance and evolution of the professional group of engineers. Also, from a different angle, we want to observe whether the professional group of engineers represents a social force in the political sphere (pressure group influencing national policy).

Within this framework, we undertook an on-line survey of engineers in Brazil, entitled “Radiografia dos Engenheiros no Brasil”. This article corresponds to the analysis of the first 69 responses to the questionnaire, recorded between June and July 2009.<sup>3</sup> Considering that the population of engineers is about 500 000 strong, the study of these initial responses has more value as a frame of reference and a general guide to the field than as a statistical illustration.

Our survey contains about 90 questions based on French studies, in particular the socio-economic situation of engineers and working conditions of executives<sup>4</sup>. Taking an average of 20 minutes, the engineers responded to four groups of questions: 1) Personal information and the characteristics of their company for those still in employment, educational background, employment history; 2) activity and professional profile, type and level of remuneration, involvement with the financial market, satisfaction and autonomy in the work situation; 3) political profile, trade union and association membership; and 4) social origin and professional mobility.

The survey was carried out in four phases. Firstly, we talked with the French researchers. Then the questionnaire was translated into Portuguese and discussed with the Brazilian researchers. The third phase consisted of testing the questionnaire on several engineers and representatives of trade unions and associations.

The questionnaire was put on line at the beginning of June and remained active until the end of August. For its diffusion, we relied on the wide support of associations, trade unions and other organisations representing the professional category nationwide. In carrying out the questionnaire and in view of the responses, the most populated regions of the country were over-represented. First

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2 The « social group » conception has not the same meaning that the « professionals », more common in the Anglophone literature. For the social group concept the social and historical context is underlined in the formation of individual identities. This idea comes into conflict against the general idea of an « established » profession (Dubar and Tripier, 1998).

3 I collected more than 400 answers before September 2009.

4 Particularly the following : « 20<sup>e</sup> enquête du CNISF sur la situation socioéconomique des ingénieurs en 2008 »; « Travail en Question – Cadres 2002 » CFDT; « Histoire de vie » INSEE; also a study of the executives of the SNCF (French National Railways). In our study, we thank the following people for their remarks and suggestions: Chantal Darsch, Maria Rosa Lombardi, Patrícia Trópia, Marcia Nori, Rafael Machiaverni, Eduardo Guerra Ibarra and Marcos Paulo da Silva.

we tried to reinforce the diffusion of the questionnaire in the regions and areas of activity which were under-represented in the sample.

A second limitation to the initial sample was the over-representation of unionised engineers. This can be explained because this population was the first to have responded to the questionnaire. We tried to correct this distortion by reinforcing the diffusion of the questionnaire to associations representing excellence within the profession and to organisations of professional branches.

This article is organised into two parts. Firstly we focus on the recent transformations to Brazilian capitalism, and especially their repercussions on the professional group of engineers and how this group has evolved over time. The second part of the article presents the initial results of the survey focusing on the general characteristics of engineers, the development of certain general trends in the job market and the political cleavages existing within the professional group.

## 2. TRANSFORMATIONS OF BRAZILIAN CAPITALISM AND THEIR IMPACT ON ENGINEERS

In this part, our discussion centres on recent changes to engineers' work situations. It is an introduction to the challenges faced by the professional group and to the ways in which engineers have organized their collective reactions. We begin by looking more globally at the transformations of the working conditions of engineers in general and then look more closely at the particular situation of the Brazilian context.

### 2.1 Engineers confronted with transformations in the productive structure.

The strong relationship between engineers and the productive structure resides in the fact that their general conditions of work and employment have undergone profound modifications in this area. Changes in the organisation of production, new configurations of technological innovation and the management of human resources have brought about structural changes that impact the professional group of engineers.

The change in the organisation of production from huge factories and industries towards a system where products and services are sub-contracted also affects engineers' identity. In as much as they are no longer concentrated inside large units of production, the productive space is no longer a place where a collective identity can be forged. Even when engineers work in the same physical space, the fact that they belong to different companies and have differing statuses affects their relationship.

Considering these new paradigms in terms of management, they affect the professional group in several ways. Although the new paradigms give engineers more autonomy for managing ordinary activities, this autonomy is restricted by the rigidity of the objectives imposed and the time pressure for achieving those objectives within strict deadlines (Paradeise, 2008).

According to Dubar and Tripier (1998), for « professionals » in general, this means that former links are weakened in favour of another type of « professional identity » which is more closely allied to a company viewpoint. Charriaux et Jean (1997) consider this movement as a « broadening of the professional sphere »<sup>5</sup> of engineers. The actors stress various levels of this, for example the purely technical level and the functional level (which is related to maintenance for those in charge of projects or products.) This involves an enlargement of the work activity towards financial and economic management as well as technology and marketing (Charriaux et Jean, 1997).

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5 « Un élargissement de la professionnalité » in the French expression.

We see this situation repeated in Brazil. According to the literature, the engineer's normal activities involve more and more responsibilities. A whole gamut of new tasks must be accomplished within a short period of time : supervising workmen, dealing with employee administration and working conditions, negotiations with trade unions, managing financial reports, liaising with suppliers and clients, carrying out quality controls, checking deadlines etc. (Lombardi, 2004 ; Laudares, 2000).

## **2.2 Engineers confronted by transformations concerning State intervention.**

In developing countries the engineers' fate is closely linked to the State. To the extent that the economy of these countries is not sufficiently developed, State intervention becomes crucial. Generally speaking, between the 1930's and the 1990's, Brazil's model for national development was guided by direct State intervention into the economy. Between 1990 and the 2000's, this model was gradually deconstructed. In the early 2000's, some investments began to bear fruit, especially in infrastructure - this opened a new period which is today tried by the economic crisis.

The evolution of the engineers' job market and their identity has been strongly influenced by State development. In the 1930's, this created the steel, electrical energy and ore mining sectors. From the 1950's economic growth was fed by a consolidated industrial base and by the development of other productive activities such as heavy industry and consumer durables, especially the auto industry. This development strategy consisted of having a policy of substitution for imports and stimulating internal production. The government set up a national bank for economic development (BNDES) and created a huge state oil company (Petrobras) which had a monopoly over the whole sector from refining the oil to controlling the distribution of derived products (Serra, 1982).

During the 1990's, this model of autonomous development was brought into question by the structural reforms implemented by successive governments. The previous period's policy of substituting imports (by home-grown articles) gave way to a policy of opening up the economy to international competition. This was the start of a strong ideological offensive against public (state owned) companies and their employees, and resulted in a period of intense privatisations (Cano, 2000 ; Biondi, 2003). Both the opening of the economy and the privatisations had an effect on employment, especially in the industrial sector. In 1991 for example, jobs in the industrial sector were cut by 25%. The literature calls this period the « de-nationalisation » of Brazilian companies in the productive sector. The share of foreign capital increased through foreign acquisitions of privatized companies. We can also note several private industries whose bankruptcy was followed by their incorporation into foreign companies (Biondi, 2003 ; Boito, 1998 ; Carneiro, 2002). According to Carneiro (2002), this period is marked by a premature and regressive process of « de-industrialisation » of the main Latin-American economies through reducing the proportion of industrial production in the GDP, and the reduction of the high technology industry throughout the fabric of industrial production.

Between 1985 and 1990, during José Sarney's government, the official rate of employment of engineers rose by 3,6%, from 144 to 172 000 jobs. After the implementation of the first neo-liberal policies – opening up commerce, privatization and reducing public investment – between 1991 and 1992 there was a fall of 11.5%. The drop in the employment rate of engineers continued until 1999, with a rate of under 2.7% (Lombardi, 2004, 79). Thus, between 1989 and 1999 about 30% of engineers' employment, or 53 166 official engineering jobs, disappeared.

Despite the reversal of this trend since 1999, with an increase of 3.4% of jobs until 2002, a low rate of professional occupation persists for engineers compared with the creation of other jobs. If we compare 2002 and 1989 (a year when there were a great many jobs for engineers (177 000)), we realise that there is still a deficit of 38 000 jobs. If we take into account the number of new engineers graduating during that period, the situation appears even more serious. Between 1991 and 2002, the number of new professionals rose from 13 000 to nearly 20 000 per year (Lombardi,

2004, 96).

During the period 2004 to the end of 2008, the country underwent a new situation. The growth of the global economy made it possible to increase the volume of Brazil's exports (especially in the sectors of agriculture and mineral extraction). This situation also increased the liquidity of Brazilian capital in the world market. The Lula government, supported by the positive balance of payments, adopted several measures to encourage internal industrialisation and the modernisation of the country's infrastructure.

In 2007, the government created the *Plano de Aceleração do Crescimento* (PAC) to increase new public and private investment in industrialisation and infrastructure. The government's forecast for investments is over 1 thousand billion R\$ (about € 300 billion) until 2010. According to government figures, investment in infrastructure compared to GDP increased by 0.64%, in 2006, to 1% in 2008. During the same period, the GDP increased as follows: 3.7% in 2006, 5.4% in 2007 and 6.4% in the first three trimesters of 2008. (Balanço do PAC, 2009).<sup>6</sup>

Figures for engineers' employment over this period are still unavailable. However, from information given by the profession's trade unions, it can be said that the economic bounce-back increased the level of employment of engineers. Until July 2008, some engineer's organisations proposed that the country double the number of graduate engineers over the coming ten years, especially in the sectors of production, mechanics and electronics (Procuram-se engenheiros, 2008).

### 3. ENGINEERS AND POLITICS IN BRAZIL

This second part is based on the first results of the survey<sup>7</sup>. This survey was designed to find out more about the engineers and their political attitudes. It enabled us to make direct connections between the engineers' structural situations in their work, their individual career paths and their relationships with political positions. At this stage of the paper we rely on the partial results of the survey to present: a very general picture of the working conditions and job market for engineers in Brazil (1), a few more recent general trends linked to current transformations of capitalism (2) and some elements of cleavages between engineers which strongly impact their political attitudes (3).

#### 3.1 Brazilian Engineers

According to the analysis of the first results of the survey, engineering continues to be a largely male profession (82%) concentrated in the South West of the country (43%). Engineers graduate most frequently in the areas of mechanics (21.7%), electricity (20.2%) and construction and public works (18.8%). The majority of engineers are trained in public universities (63.7%). The branches of employment which employ them the most are: civil construction; telecommunications, electronics, information technology, agriculture and energy, food production and the food industry. About 14.4% of engineers are unemployed, (60% since January 2009); 4.3% are retired and 81.1%

6 The PAC thus met the demands of the National Federation of Engineers and its movement for the country's development « Cresce Brasil + Engenharia + Desenvolvimento ». In 2006, engineers in the organisation issued a manifesto for the urgent uptake of several measures which were almost all satisfied by the PAC (*Manifesto Cresce-Brasil, 2006; FNE, 2007*).

7 This research was made up of different phases using open source software. LimeSurvey was used for the creation and diffusion of the questionnaire. For statistical data, R software, especially « R Commander » was invaluable. Then for word processing and tables we relied on OpenOffice. During this phase, we relied on the support of the Lest technicians, particularly Sara Famiglietti, Patrice Cacciuttolo and Gregory Conu.

are working. Amongst these, 64.3% have a permanent contract, 8,9% have a short term contract, 10,7% have tenure as state officials, 12.5% are self employed and 3.6% have their own company.

Engineers' revenue is concentrated between a minimum of 5 and 20 salaries per month<sup>8</sup>. However, 10% of engineers have a high level of revenue, over R\$ 111 600 per year, (equivalent of over 61 000 USD per year).

<b>Table 1: Engineers' Revenue (in relation of one minimum of R\$ 465,00 – value of June 2009)</b>				
<5	5 – 10	10 – 20	20 – 30	30 >
4.3%	33.3%	33.3%	7.2%	2.8%

Source: survey « Radiografia dos Engenheiros no Brasil »

In general, the highest revenues are those of engineers attached to the private sector. The distribution of workers by type of employer is as follows: 55.4% work in the private sector; 16.1% in public companies; 8.9% in the administrations and public services of cities and regions; 14.3% are company owners or self employed and 5.4% work for NGO's and associations. Amongst private sector engineers, 58% work in a company which depends on a foreign group or company. Even if we do not have previous comparative data, it can be supposed that this figure corresponds to the effects of the process of de-nationalisation of the Brazilian economy.

From the engineers working in the private sector and for the state, a large proportion work for companies with over 500 employees. Amongst those in the private sector, 29% work for companies with from 500 to 1 999 employees and 38.7% in companies with over 2 000 employees. For public sector workers, these figures are 33.3% and 44.4%, respectively.

Generally speaking, half the engineers from all sectors carry out activities of surveying and design, research, and conception and management of projects. The two most frequent activities in the survey responses are: Production (13%) and Executive Director (8,6%). It is interesting to note that the latter are not those with the highest revenues: amongst the 6 engineers who say they work as executive directors, only 1 belongs to the "richest" 10% (indeed, he is the only one who works in the private sector and who is not the head of a company).

### **3.2 General trends of the evolution of Brazilian capitalism affecting engineers**

From the total number of 56 working engineers, 32% undertake a supervisory management role. Amongst these, 72% are project managers. Amongst working engineers who have no management role, the proportion of project managers is just as high, 63.2%. This means that the engineers in our sample have different levels of responsibility and remuneration: (1) there are project managers who are high level managers and these are generally well paid : (50% have a responsibility such as executive director and are paid over 30 salaries minimum); (2) middle management project managers (supervise a team, an office or a department) with a revenue of between 5 and 20 salaries ; and (3) just over one third of the engineers (34.8% of the sample) are responsible for a project, but have no supervisory or hierarchical position. The majority of this group (75%) whose revenue is no more than 20 salaries, has on one hand little economic and financial influence over the tasks performed (60%) but on the other hand, are autonomous in their technological decisions (45%).

<sup>8</sup> The question concerning engineers' revenue related to the gross revenue for the whole of 2008 (salaries, advantages, bonuses etc.). We used 5 levels of remuneration. Without mentioning this on the questionnaire, we used the value of the minimum salary for June 2009 as a reference for the various levels of revenue : (1) under 5 salaries accumulated during one year ; (2) between 5 and 10 ; (3) between 10 and 20 and (4) over 30 salaries.

Nearly one third of our engineers are drawn towards financialization, more specifically: 33.3% of the sample receive bonuses or stock options linked to the companies' financial results. Amongst these engineers, 91.3% work in the private sector, 60% carry out surveys and design work, research, project conception and management. 73.9% are project managers and 82.6% have no hierarchical responsibility. It can be asserted that the « path to financialization » is well advanced for one category of engineers: over 40% of engineers possess shares and 10% receive financial profits amounting to between 10% and 30% of their revenue.

On noticeable trend for engineers is the weakening of support for nationalism amongst the youngest - those who have entered the job market since the 1990's. We use the term « General nationalism » to designate those engineers who, to a greater or lesser degree (either generally – diffuse or in a more interventionist sense), supported the necessity of maintaining the national nature of the large Brazilian productive companies.<sup>9</sup> As shown in table 2, engineers born in the 1960's have a strong tendency to favour the national nature of companies (80%). This is reduced by over 20% for the younger generation – (under 60%).

Table 2: Age compared with general nationalism among engineers.

Age	1960	1970	1980
Gen. Nation.	80.0%	57.1%	58.4%

Source: survey « Radiografia dos Engenheiros no Brasil »

On the other hand, this weakening of general nationalism amongst the young does not mean that attitudes are siding towards liberal policies of no radical state intervention in the economy. The engineers' position is that investment in infrastructure and social services still require strong State intervention.

For engineers, the idea that the State should be the main motor of investment in infrastructure remains entrenched: 60.9% think that this investment is highly necessary either to develop infrastructure of for the country's sovereignty. Only 8.6% think that the important thing is company investment, and 2.8% consider that the State should reduce its spending – these are the two most liberal positions.

Concerning social policy, engineers responses were almost unanimous: their conception being that « the Education, Health and well being of citizens are the obligations of the State »<sup>10</sup>.

9 Question S11 asked engineers their opinion of large privatised Brazilian companies such as Petrobras (oil), Embraer (aeroplanes) and Vale do Rio Doce (mining). There were six possible responses:

- 1) A free marketer who specified « The government should not intervene. Let them be regulated by the laws of the global market ».
- 2) A "diffuse nationalist" who said « They should still be Brazilian with national capital, whether public or private »
- 3) A nationalist interventionist who said : « The Brazilian State should nationalise them and try to be a major shareholder ».
- 4) A nationalist for state intervention and management who said : « The Brazilian State should re-nationalise these companies and take over their management ».
- 5) A nationalist interventionist for certain cases who said « The government should only take back the control of Petrobras »; and
- 6) « Another opinion ».

In these responses, we did not refer to the different types of nationalism. The responses were presented in a different order for each new respondent. All questions in the survey concerning the political profile of engineers could be left unanswered.

10 Question S14 asked engineers their opinion of State social policy such as citizens' health, education, leisure and



Another noticeable trend amongst the young generation is the significant reduction in trade union membership. Table 3 shows a gradual reduction of the rate of trade union membership. Even if trade unionists might be over-represented in our sample, (compared to the 1997 rate which was 13% for men and 8% for women), it is important to mention that this trend exists.

Table 3: Proportion of Trade Unionists by decade of birth

Trade Unionism/ Date of Birth	Membership	No longer	never
1940-50's	55.6%	11.1%	33.3%
1960's	54.3%	20.0%	26.7%
1970's	28.6%	4.8%	66.7%
1980's	20.8%	4.2%	75.0%

Source: survey « Radiografia dos Engenheiros no Brasil »

### 3.2 Elements of cleavage amongst engineers

We noticed three tendencies in engineers' political opinions concerning large Brazilian productive companies. These opinions can be identified either as « diffuse nationalism », « interventionist nationalism » or « free market ».

By « diffuse nationalism » we understand those political attitudes which agree on the necessarily national nature of companies financed by public or private capital, without however being in favour of State intervention. This latter stance is characteristic of the « nationalist interventionist » engineers. We divided this last type of nationalism into two sub-types : State interventionists those in favour of state intervention in the economy without state management of the companies concerned - and « State management interventionists » those who defended direct State intervention in the company management. The « free market » stance is held by those who are against all State intervention in the economy. They favour “free regulation” by the global market.

We mentioned above a general trend towards diminishing « general nationalism » amongst engineers according to age. If this is further analysed by decades of birth, we observe that age is an element of cleavage between engineers. Specifically, the personal history of different generations of engineers influences their political stance. Engineers born between 1940 and 1950 are those who are most in favour of the State taking back the management of large Brazilian companies. Engineers born in the 1960's are the most interventionist: 33% are in favour of nationalising the companies by buying shares, and 20% are in favour of taking back state management. If we observe table 4, we see that amongst the youngest generations (born between 1970 and 1980) : there is an increase in diffuse nationalism, and also a reduction in interventionist nationalism.

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well being. Five different responses were possible:

- 1) « This area has nothing to do with the state. It is up to each individual to be prepared, work for his/her own education, health and well being and those of his/her children »;
- 2) « The education, health and well being of citizens are obligations of the State »;
- 3) « The state should take care of Education, and leave the other areas alone »;
- 4) « The state should only deal with preventive health and basic education. Beyond this, health and education are the responsibility of each individual » and
- 5) « Other». Reformulate the possible responses

Table 4: Political stance concerning large companies according to decade of birth.

Political Stance / Date of Birth	Diffuse Nationalism	Nationalism Interventionist		Free Market
		State Interv.	State Manag. Interv.	
1940-50's	33.3%	0.0%	22.2%	33.3%
1960's	26.7%	33.3%	20.0%	13.3%
1970's	38.1%	19.0%	0.0%	33.3%
1980's	54.2%	4.2%	4.2%	29.2%

Source: survey « Radiografia dos Engenheiros no Brasil »

If we consider that an engineer enters the job market aged about 23 (1 year of preparatory classes, then 5 years to finish the diploma), the most nationalist interventionist engineers (those born during the 1960's) – are those who entered the job market when the productive structure was being transformed. They thus lived through the immediate effects of changes such as (the lessening of) State intervention. These engineers, who were over 30 years old during the first neo-liberal reforms of the 1990's were also those who faced unemployment : 20% have already been unemployed two or three times. On the other hand, engineers born since 1980, who have never worked in a political context of strong State intervention, are those with the lowest percentage of responses in favour of interventionist nationalism (8.4%).

The distinction between public and private remains an important element of cleavage between among engineers (Cf. Table 5). Engineers from the public sector working in non productive sectors (generally in regions, cities and hospitals) are those who are most in favour of interventionist nationalism (80%). This trend is also present - to a lesser extent - amongst public or mixed capital companies (66,7%). On the contrary, engineers in the private sector are those who most frequently respond in favour of the free market position (38,7%).

Table 5: Political stance concerning large companies according to type of employer.

Political Stance / Type of employer	Diffuse Nationalism	Nationalism Interventionist		Free Market	No answer / others
		State Interv.	State Manag. Interv.		
Independent workers	50%	0.0%	0.0%	37.5%	12.5%
Private Sector	38.7%	6.5%	9.7%	38.7%	6.5%
Public Sector – Companies	66.7%	11.1%	11.1%	11.1%	0.0%
Public Sector – cities/regions	20%	60%	20%	0.0%	0.0%
others	33.3%	0.0%	0.0%	0.0%	66.6%

Source: survey « Radiografia dos Engenheiros no Brasil »

The increase in the number of engineers attached to the idea of the financialization of the economy is also an element of cleavage in engineers' political attitudes. A comparison between the political position of the whole sample towards large productive companies (table 6) with that of the 40% who hold shares in the stock-market (table 7), shows a difference. When all engineers are taken together, the proportion of those with political attitudes tending towards diffuse nationalism and the free market is 40-27. If we take the group of engineers whose revenue partly depends on financial investments, we observe a proportion of about 45-45. This means that this latter group of engineers is more in tune with free market ideas – and policies.

Table 6: Political position of the whole sample towards large companies

Political position	Diffuse Nationalism	Nationalism Interventionist		Free Market	No answer / others
		State Interv.	State Manag. Interv.		
Whole sample	40.5%	14.4%	8.6%	27.5%	4.3%

Source: survey « Radiografia dos Engenheiros no Brasil »

Table 7: Political position towards large companies according to percentage of « financial » revenue.

Political position	Diffuse Nationalism	Nationalism Interventionist		Free Market	No answer / others
		State Interv.	State Manag. Interv.		
< 10%	47.1%	0.0%	0.0%	47.1%	5.9%
10 – 30%	42.9%	0.0%	14.3%	42.9%	0.0

Source: survey « Radiografia dos Engenheiros no Brasil »

Another aspect which we attracted our attention was the strong tendency amongst engineers in public companies to take on the ideas of private management. When these engineers are faced with choosing between private or public management, a significant proportion of them chose the private option (44%). On the contrary, 80% engineers from the non productive sector, working in towns and regions, especially in administration or services, refused the private option.

There are enough elements to suggest that engineers in public companies are not completely opposed to public management. In the questionnaire, we asked about the reasons for preferring private management. The engineers from public companies who responded in favour of this justified their choice as follows: private management is “targeted towards client needs” (50%). When we wonder about this apparent incongruity, we can suppose that the integration of certain new management tools into public companies – such as the optimization of resources and the increase of autonomy – may have influenced these engineers towards their favourable attitude. Moreover, when asked about the guarantee of job security for public employees, 75% of these engineers were in favour.

#### 4. CONCLUSIONS

In this paper, we have tried to show that the recent transformations of Brazilian capitalism have had a fairly strong influence on the collective identities and political attitudes of engineers in Brazil. This does not mean that there is a relation of cause and effect. Far from saying this, our objective was to bring some elements to bear into a more complex picture involving the relationship between the political situation and groups of actors.

From the partial analysis of an ongoing survey, we have been able to observe that the changes introduced into the Brazilian economy and society since the 1990's have impacted engineers fairly strongly. On one side, transformations of the productive structure and on the other the change in type of State intervention (tending towards neo-liberalism) have played an important part in the redefinition of the professional group of engineers and in the formation of their collective identities.

Concerning the organisation of productive activities, there is a polarisation with a small group of engineers, high level managers and project leaders who are well paid; and at the other end of the spectrum we find a mass of engineers who are not managers but who are nevertheless responsible for projects. The characteristic of this latter group is that their professional situation gives them a high level of autonomy in their technological choices, countered by less autonomy in financial and economic areas. The enlargement of these engineers' activities is not matched by the rise in salaries seen at upper management levels.

On the other hand, a few elements lead us to think that new management tools may have a positive impact which is felt by those engineers working in public productive companies. A case in point is these engineers strong preference for private management which takes account of client needs.

We also noticed a trend amongst the youngest engineers, towards a gradual reduction in trade union membership and nationalism. In order to better understand this point, we categorised the political opinions of engineers towards large large Brazilian companies into four types : «diffuse nationalism », « State interventionist nationalism », « State management interventionist nationalism » and « free market ». We have shown that a double trend exists: the strong interventionist nationalism among engineers who lived through the transformations of the employment market from 1980-1990 contrasts with a strong diffuse nationalism – combined with a relatively favourable attitude towards liberal policies – amongst the youngest engineers who never knew the time of strong State intervention when the country was being developed.

Another important transformation in Brazilian society which influences engineers' political attitudes is that of the financialization of the country's economy. Some engineers have been encouraged to participate in the development of financial markets through bonuses and incentives. When this is crossed with their political position, we find that their integration of the reasoning of market finance has influenced their political attitudes towards the liberal field.

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